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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/811,738	03/29/2004	Craig Printy	P05885	1684

23990 7590 06/13/2006

DOCKET CLERK
P.O. DRAWER 800889
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EXAMINER	
NGUYEN, SANG H	

ART UNIT	PAPER NUMBER
2877	

DATE MAILED: 06/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Offic Action Summary	Application No.	Applicant(s)	
	10/811,738	PRINTY ET AL.	
	Examiner	Art Unit	
	Sang Nguyen	2877	

-- The MAILING DATE f this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,8-10,14-16 and 20* is/are rejected.

7)☒ Claim(s) *5-7, 11-13, and 17-19* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Obj ctions

Claims 1 and 13 are objected to because of the following informalities:

In claim 1 line 9; applicant should add the word "add" after the "germanium film".

In claim 13 line 1; applicant should change the "4" to –10--.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 8-9, and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prior Art of Present Invention (figures 1-4) in view of Rosencwaig et al (U.S. Patent No. 6,278,519).

Regarding claims 1, 3, 9 and 14-15; Prior Art of Present Invention discloses a method for determining a germanium concentration of a silicon germanium film, said method comprising the steps of:

providing a blank wafer of silicon (110 of figure 1) is deposited germanium to form germanium film (120 of figure 1);

measuring the germanium concentration of a silicon germanium film (120 of figure 1) by a SIMS method (130 of figure 1); and

determining said germanium concentration of said silicon germanium film by identifying a germanium concentration by an analyze results of SIMS method (140 of figure 1 and page 2 paragraph [0004] to page 3 paragraph [0008] and page 10 paragraph [0032] to page 11 paragraph [0034]). See figures 1-4.

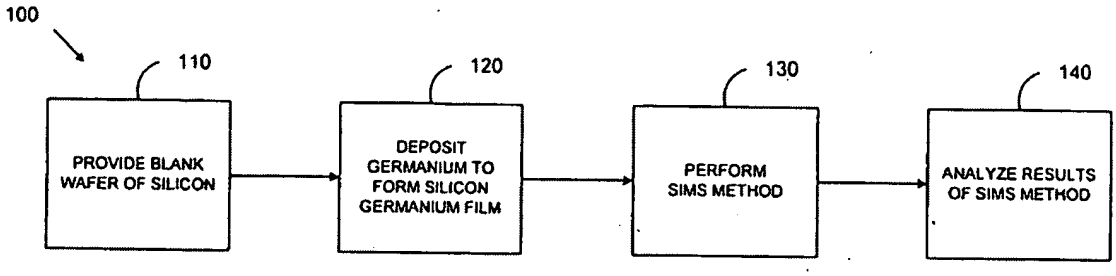

FIGURE 1
PRIOR ART

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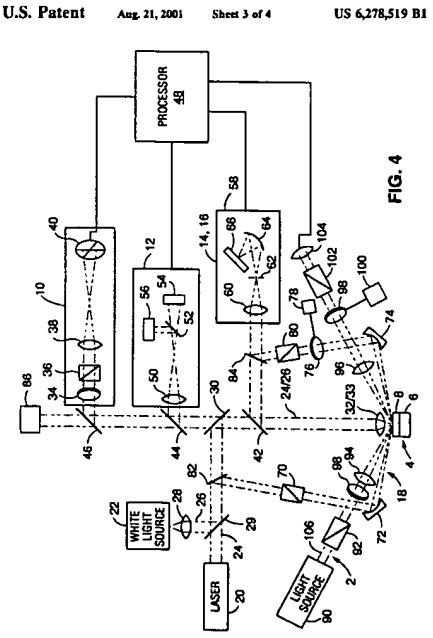

FIG. 4

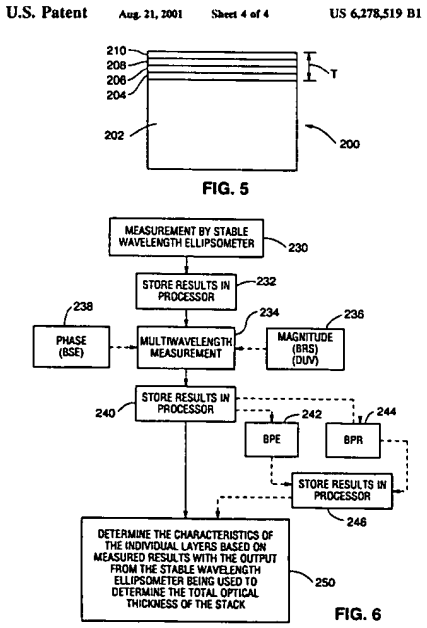

FIG. 5

FIG. 6

PAPI discloses all of features of the claimed invention except for performing a thermal oxidation procedure on said silicon germanium film to

create a layer of thermal oxide over said silicon germanium film, measuring a thickness of said layer of thermal oxide; and providing a correlation that relates a thickness of a layer of thermal oxide created over a silicon germanium film. However, Rosencwaig et al teaches that it is known in the art to provide apparatus and method for analyzing multi-layer thin film stacks on semiconductors comprising performing a thermal oxidation layer (8 of figure 4) procedure on said silicon germanium film (6 of figure 4 or 202 of figure 5 and col.12 lines 45-53) to create a layer of thermal oxide (8 of figure 4) over said silicon germanium film (6 of figure 4 or 202 of figure 5 and col.12 lines 45-53), measuring a thickness (d of figure 4) of said layer of thermal oxide (8 of figure 4) by a composite optical measurement system (1 of figure 4); and providing a correlation that relates a thickness of a layer of thermal oxide created over a silicon germanium film by a processor (48 of figures 4-6 and col.3 lines 14-64). See figures 1-6.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine method of PAPI with performing a thermal oxidation procedure on said silicon germanium film to create a layer of thermal oxide over said silicon germanium film, measuring a thickness of said layer of thermal oxide; and providing a correlation that relates a thickness of a layer of thermal oxide created over a silicon germanium film as taught by Rosencwaig et al for the purpose of measuring and improving accurately characterize multi-layer thin film stacks.

Regarding claims 2, 8, and 16; PAPI discloses all of features of claimed invention except for said step of measuring a thickness of said layer of thermal oxide in real time by making a plurality of thickness measurements of the thickness of the layer of thermal oxide using one an interferometer, an ellipsometer, and a spectroscopic ellipsometer. However, Rosencwaig et al teaches that it is known in the art to provide apparatus and method for analyzing multi-layer thin film stacks on semiconductors comprising step of measuring a thickness of said layer of thermal oxide comprises measuring said thickness of said layer of thermal oxide (8 of figure 4) in real time by making a plurality of thickness measurements of the thickness of the layer of thermal oxide using one an interferometer, an ellipsometer, and a spectroscopic ellipsometer (i.e., BPE [10 of figure 4], BPS [14 of figure 4], BRS [14 of figure 4], DUV [16 of figure 4], and BSE [18 of figure 4]). It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine method of PAPI with step of measuring a thickness of said layer of thermal oxide comprises measuring said thickness of said layer of thermal oxide in real time making a plurality of thickness measurements of the thickness of the layer of thermal oxide using one an interferometer, an ellipsometer, and a spectroscopic ellipsometer as taught by Rosencwaig et al for the purpose of measuring and improving accurately characterize multi-layer thin film stacks.

Claims 4 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over PAPI in view of Rosencwaig et al as applied to claim 14 above, and further in vi w of Yen (U.S. Patent No. 6,639228).

Regarding claims 4 and 10; PAPI in view of Rosencwaig et al discloses all of features of claimed invention except for the correlation that relates a thickness of a layer of thermal oxide created over a silicon germanium film to a germanium concentration is an approximately linear correlation. However, Yen teaches that it is known in the art to provide the correlation that relates a thickness of a layer of thermal oxide created over a silicon germanium film to a germanium concentration is an approximately linear correlation (figures 2-4). It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine method of PAPI with the correlation that relates a thickness of a layer of thermal oxide created over a silicon germanium film to a germanium concentration is an approximately linear correlation as taught by Yen for the purpose of measuring accuracy the thickness of oxide layer after thermal process.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over PAPI in view of Rosencwaig et al as applied to claim 14 above, and further in view of Nozawa et al (U.S. Patent No. 6,277,657).

Regarding claim 20; PAPI in view of Rosencwaig et al discloses all of features of claimed invention except for exposing the silicon substrate layer to a gas comprising silane gas and germane gas in hydrogen gas carrier. However, Nozawa et al teaches that it is known in the art to provide exposing the silicon substrate layer to a gas comprising silane gas and germane gas in hydrogen gas carrier (abstract and figure 1). It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine method of PAPI

with exposing the silicon substrate layer to a gas comprising silane gas and germane gas in hydrogen gas carrier as taught by Nozawa et al for the purpose of determining a timing of switching between a process of supplying the gas to the vacuum vessel.

Allowable Subject Matter

Claims 5-7, 11-13, and 17-19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record, taken alone or in combination, fails to discloses or render obvious a method for determining a germanium concentration of a silicon germanium film comprising all the specific elements with the specific combination including of the step of said approximately linear correlation is described by: oxide Thickness (Ã) = 45.55035 + 2.2670656 Ge% where said term Oxide Thickness is in units of ângstroms; and where said term Ge% represents a germanium concentration in a silicon germanium film in terms of germanium percentage set forth in claims 5, 11, and 17.

The prior art of record, taken alone or in combination, fails to discloses or render obvious a method for determining a germanium concentration of a silicon germanium film comprising all the specific elements with the specific combination including of the step of said approximately linear correlation is described by: Relative Oxidation Rate = 0.9795774 + 0.0487541 Ge% where said term Relative Oxidation Rate represents a ratio of a thickness of thermal oxide on a

silicon wafer without a silicon germanium film; and where said term Ge% represents a germanium concentration in asilicon germanium film in terms of germanium percentage set forth in claims 6, 12, and 18.

The prior art of record, taken alone or in combination, fails to discloses or render obvious a method for determining a germanium concentration of a silicon germanium film comprising all the specific elements with the specific combination including of the step of said approximately linear correlation is described by: Ge% = -20.03043 + 20.470103 Relative Oxidation Rate, where said term Relative Oxidation Rate represents a ratio of a thickness of thermal oxide on a silicon germanium film to thickness of thermal oxide on a silicon wafer without a silicon germanium film; and where said term Ge% represents a germanium concentration in a silicon germanium film in terms of germanium percentage set forth in claims 7, 13, and 19.

said approximately linear correlation is described by: Ge% = -20.03043 + 20.470103 Relative Oxidation Rate, where said term Relative Oxidation Rate represents a ratio of a thickness of thermal oxide on a silicon germanium film to thickness of thermal oxide on a silicon wafer without a silicon germanium film; and where said term Ge% represents a germanium concentration in asilicon germanium film in terms of germanium percentage.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Liu et al (6895360) discloses method to measure oxide thickness by FTIR; Xu et al (6759255) discloses method and system for detecting

metal contamination; Dautartas et al (6731386) discloses measuring technique for ultra-thin oxides; Kwon (6519045) discloses method and apparatus for measuring very thin dielectric film thickness; Marumo et al (6331890) discloses thickness measuring apparatus and method; Xiger (5982496) discloses thin film thickness; Imai et al (5818596) discloses film thickness measuring apparatus; Kato (5298860) discloses method of analyzing metal impurities in surface oxide film.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sang Nguyen whose telephone number is (571) 272-2425. The examiner can normally be reached on 9:30 am to 7:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on (571) 272-2800 ext. 77. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service

Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

June 6, 2006

Sang Nguyen
Patent Examiner
Art Unit 2877